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Revealing attitude toward statistics among MA TEFL students: A Systemic Functional Linguistics perspective

JOANNA PITURA

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Abstract

Higher education students' attitudes toward statistics are of great importance as these may affect student performance and achievement in statistics learning. Despite some interest in attitude towards statistics among higher education students in language-related fields and the broader area of tertiary-level education, the different types of existing attitudes toward statistics might remain uncovered. Applying the Attitude system as an analytical framework, this study explores how higher education students use linguistic resources to indicate statistics-related attitude before, during and after learning. The narratives of learning statistics were obtained from a group of MA TEFL students (n=25) who participated in an introductory course on basic statistical concepts and procedures, among others. The study makes visible a great variety and a considerable variation of linguistic means which students use to express statistics-related attitude as Judgement, Appreciation and Affect, emerging over time. As such, this study advances methodological practices and training in the field.

Keywords

attitude, Systemic Functional Linguistics, statistics

Odkrywanie podejścia do statystyki wśród studentów filologii angielskiej na poziomie magisterskim: perspektywa systemowej lingwistyki funkcjonalnej

Abstrakt

Postawy studentów szkół wyższych wobec statystyki mają ogromne znaczenie, ponieważ mogą one wpływać na wyniki i osiągnięcia studentów w nauce statystyki. Pomimo pewnego zainteresowania postawą wobec statystyki wśród studentów kierunków związanych z językami i studentów w szkolnictwie wyższym, różne rodzaje istniejących postaw wobec statystyki mogą pozostawać nieznane. Wykorzystując system postaw (*Attitude system*) jako ramę analityczną, niniejsze badanie docieka, w jaki sposób studenci szkół wyższych wykorzystują zasoby językowe do określania postaw wobec statystyki przed, w trakcie i po nauce. Narracje dotyczące uczenia się statystyki uzyskano od grupy studentów studiów magisterskich specjalności metodyka nauczania języka angielskiego (n=25), którzy uczestniczyli w kursie wprowadzającym, m.in., podstawowe pojęcia i procedury statystyczne. Badanie uwidacznia ogromną różnorodność zasobów językowych używanych przez studentów do wyrażania postaw wobec statystyki, takich jak osąd, docenianie i afekt, pojawiających się w miarę upływu czasu.

Słowa kluczowe

postawa, systemowa lingwistyka funkcjonalna, statystyka

1. Introduction

Higher education students who work towards their MA thesis research projects in Applied Linguistics and related fields, i.e. Second Language Acquisition (SLA), Teaching English as a Foreign Language (TEFL) or Teaching English to Speakers of Other Languages (TESOL), need to develop statistical competence so as to be able to use and produce quantitative research (Gass et al. 2020; Gass and Plonsky 2020; Gonulal et al. 2017). To this end, these students are typically offered various forms of statistical education, wherein their attitudes towards statistics is of great importance as these may affect student performance and, ultimately, achievement (Emmioğlu and Capa-Aydin 2012; Ramirez et al. 2012).

There has been relatively little interest in attitude towards statistics among higher education students in language-related fields (e.g. Gonulal et al. 2017; Huang 2013) and the broader area of tertiary-level education (e.g. Lalayants 2012; Smith 2017; Snider and Eliasson 2013). Although this research demonstrates that students hold a range of attitudes that may or may not support their learning of statistics, the different types of existing attitude toward statistics might not have been uncovered yet, mainly due to the way the construct under study has been conceptualised and measured. This poses a problem for research and practice contexts which require awareness of the diversity of student reactions, feelings and beliefs around statistics. Hence, further research is needed to understand higher education students' attitude around statistics in a more nuanced way.

Applying concepts from Systemic Functional Linguistics – the Attitude system (Hood 2019; Martin 2000; Martin and Rose 2007; Martin and White 2005), this narrative inquiry study seeks to explore how Polish MA TEFL students, participating in an author-led course on, among others, basic statistical concepts and procedures, use linguistic resources to indicate statistics-related attitude before, during and after their learning. By providing evidence of evaluative language used with refe-

rence to learning statistics, this study reveals the different types of attitude that exist among these students and how their attitude evolves over time, which may be of interest to researchers, instructors, curriculum designers and policymakers involved in planning and delivery of statistical education at the tertiary level.

2. Research into attitudes toward statistics in higher education students

Research into attitudes toward statistics among higher education students in the area of Applied Linguistics and related fields is sparse. In one study, Huang (2013) investigated statistics competence, perceived value of statistics learning and the use of the SPSS statistical software. The data were collected through a self-report questionnaire from a group of applied English students of MA programs (n=52) at a technological university in Taiwan. The study found moderate correlation between student understanding of statistics and their perception of the importance of statistics, as well as correlation between understanding of statistical tests and the belief that SPSS literacy facilitates understanding of statistics. It was also found that students who believed that SPSS literacy helps understand statistics also believed that statistics makes it possible to understand research articles. In another study, Gonulal et al. (2017) explored the development of statistical literacy in MA and PhD students in Applied Linguistic programs, TESOL/TEFL, SLA, and education in general. Participants were students of research methods or statistics courses taught at US universities. The data was gathered using a pre-course survey (n=50) and a post-course survey (n=31) which consisted of four scales, two of which measured attitudes towards statistics and statistical self-efficacy. The results show that participants' statistical confidence and their views on the importance of statistics were high in the pre-survey and remained on the same level in the post-survey, and that there was an increase in participants' statistical self-efficacy. Overall, the results of these unique studies

provide evidence of positive attitudinal changes when students take part in statistics courses and imply that students in language-related fields may become more confident as learners and users of statistics. These research findings also suggest that students' perceptions of the value of statistics tend to be favourable when they feel competent and that literacy in statistical software fosters these positive views.

Research into student attitudes towards statistics conducted in the broader area of tertiary-level statistical education generally confirms the findings obtained in the studies outlined above, but also indicates that the range of existing types of attitudes is much wider. The results of Lalayants' (2012) survey study conducted among US graduate social work students (n=195) show that many students did not feel comfortable with statistics, they felt nervous and anxious when taking a statistics course, as well as intimidated when dealing with statistical concepts. Students reported different kinds of fear, i.e. fear of math, fear of unknown, and fear of failing, and some students did not perceive the relevance of statistics to their own profession. Two other published studies dealt with ways of improving student reactions to statistics. Snider and Eliasson (2013), to increase undergraduate management students' interest in learning forecasting techniques, implemented a game in which students competed in groups while doing a forecasting exercise. The data was obtained through a survey (n = 247) in order to understand student perceptions of the game. The results showed that the game enhanced student interest in learning forecasting techniques, as reported by the majority of participants. In another study, Smith (2017) investigated, among others, the impact of gamified modules on attitudes towards statistics. Participants were US undergraduate psychology students enrolled in introductory statistics courses; students in the experimental group (n=24) were compared to students completing the course without gamified modules. The data was collected using a quantitative survey that consisted of six dimensions: affect (defined as "student's general attitude toward statistics"), cognitive competence ("students' perceptions of their ability to achieve in a sta-

tistics course"), value ("the attitude of how valued statistics are in the world"), difficulty ("the student's attitude regarding how difficult statistics is in practice"), interest ("student's interest in statistics"), and effort ("student's effort put towards learning statistics") (p. 9). It was found that cognitive competence, affect, value and difficulty were positively influenced by gamified exercises but, unexpectedly, students' interest in statistics diminished. On the whole, these few studies demonstrate the variation and complexity of statistics-related attitude. Importantly, while many students may initially hold negative attitudes, their learning experiences may or may not support the emergence of attitudes that facilitate statistics learning.

Taken together, despite some research attention focused on higher education students' attitudes toward statistics, many types of existing attitude may remain unidentified. This is so mainly due to the fact that the construct of attitude has been operationalised as generalised reactions, beliefs, feelings, and predispositions towards statistics and measured cross-sectionally using quantitative surveys targeting pre-defined sets of reactions, beliefs, feelings, etc. (except for Lalayants, 2012). Consequently, researchers and practitioners may find themselves insufficiently equipped to understand an array of attitudes in statistics education classrooms. In view of that, this qualitative study adopts the Attitude system–a subsystem of the Appraisal framework–to investigate the linguistic resources MA TEFL students use in their stories to indicate attitudes they hold before, during and after their learning of statistics.

3. Theoretical background

The Appraisal framework (Martin 2000; Martin and Rose 2007; Martin and White 2005), which is part of Systemic Functional Linguistics, recognises the role of language in sharing values in social contexts (Hood 2019). This framework provides a systematic account of language resources grouped in three subsystems, each of which has a detailed network of meaning choices, i.e. (1) Attitude, which consists of language resources for

expressing emotions, reactions, beliefs etc., (2) Engagement – for expressing one's stance, and (3) Graduation – for grading meaning in language (Hood 2019). This study uses one of these subsystems, i.e. Attitude, as an inventory of linguistic resources to uncover positive and negative evaluations of statistics in students' narratives of statistics learning.

The Attitude system consists of the linguistic resources grouped in three categories: Affect, Judgement and Appreciation (Hood 2019; Martin and White 2005). Attitude as Affect refers to language resources used for expressing emotions and reactions, organised in three sets to do with dis/inclination, un/happiness, in/security and dis/satisfaction. Attitude as Judgement consists of language resources for evaluating people and/or their behaviour as admiration, praise, criticism or condemnation. Attitude as Appreciation comprises language resources for positive and negative evaluations of things and ideas. Attitude can be expressed either directly (inscribed attitude) or indirectly (invoked attitude). The three sub-systems of Attitude with examples of lexical instantiations are presented in Table 1.

Table 1
The Attitude system and lexical instantiations
(Martin and White 2005: 48–51)

Category	Type			Lexical instantiation
Affect	Dis/ inclination	Fear		wary, fearful, terrorised
		Desire		miss, long for, yearn for
	Un/ happiness	Unhappiness	Misery	cry, sad
			Antipathy	abuse, dislike
		Happiness	Cheer	laugh, cheerful
			Affection	hug, love
	In/ security	Insecurity	Disquiet	restless, uneasy
			Perturbance*	cry out, startled

		Security	Confidence	assert, confident
			Trust	entrust, comfortable with
	Dis/ satisfaction	Dissatisfaction	Ennui	tune out, jaded
			Displeasure	scold, bored with
		Satisfaction	Interest	attentive, involved
			Pleasure	compliment, satisfied
Judgement	Social esteem	Normality	Admire	lucky, cool
			Criticise	unpredictable, obscure
		Capacity	Admire	literate, competent
			Criticise	inexpert, ignorant
		Tenacity	Admire	careful, meticulous
			Criticise	distracted, stubborn
	Social sanction	Veracity	Praise	honest, tactful
			Criticism	deceptive, manipulative
		Propriety	Praise	good, caring
			Criticism	unfair, rude
Appreciation	Reaction	Impact	Positive	arresting, fascinating
			Negative	tedious, monotonous
		Quality	Positive	okay, appealing
			Negative	bad, off-putting
	Composition	Balance	Positive	consistent, logical
			Negative	contradictory, disorganised
		Complexity	Positive	elegant, precise
			Negative	unclear, plain

	Valuation	Positive	innovative, valuable
		Negative	ineffective, useless

*Following Martin (2017), the sub-category of "surprise" has been renamed to "perturbance".

The system of Attitude has been applied to analyse discourse produced in various contexts. It has been used to investigate evaluative language in written texts among primary and secondary school students in natural science, history, art and English (Matruglio 2018; Whittaker and McCabe 2020), higher education students' reflective writing (Szenes and Tilakaratna 2021; Tilakaratna et al. 2019), critical reflection assignments among student-nurses (Monbec et al. 2020), online discussions (Lander 2015), summary writing (Hood 2008), and published research papers (Hao and Humphrey 2009; Moyano 2019; Stosic 2021). The system of Attitude has also been applied to study spoken and body language in a health science lecture (Hao and Hood, 2019), pedagogical discourse in language instruction (Troyan 2021), as well as humour in people with communication problems (Keegan et al. 2021). This body of literature illustrates the utility of the Attitude system as a robust analytical framework which provides a repertoire of lexis that can be used to register attitude in discourse.

Drawing on the system of Attitude, this study explores student positive and negative statistics-related attitude as Judgement, Appreciation and Affect, emerging and evolving among MA TEFL students enrolled in a course aimed at developing their statistical competence, becoming evident in their stories of this experience through the choice of evaluative language. The following research questions guide this study:

1. What type of linguistic resources do students use to express Judgement of themselves as statistics learners before, during and after statistics learning?

2. What type of linguistic resources do students use to express Appreciation for statistics before, during and after statistics learning?
3. What type of linguistic resources do students use to express Affect around statistics before, during and after statistics learning?

4. Research design

4.1. Methodology

This study assumes the constructivist position about knowledge claims, recognising that ways of knowing depend on individual construction and interpretation of reality, which may change over time (Croker 2009). From this epistemological perspective, a narrative approach was adopted as a method of inquiry to gain insight into the different ways higher education students construct attitudes around statistics over the course of instruction. This strategy of inquiry is appropriate when the aim is to understand, as Murray (2009) puts it, "the changing conditions of lives and the impact these new conditions can have over time on all aspects of an individual's life" (p. 47). Student written stories–narratives of their statistics learning–were collected and analysed to understand how students use language to express judgement of themselves as learners of statistics, their appreciation for statistics, as well as emotional reactions, unfolding as students increase their statistical competence.

4.2. Context and participants

The context for the current study is a two-year MA TEFL programme, offered by the Institute of English Studies at a university in southern Poland. During their studies, students follow courses in, among others, psychology, pedagogy, didactics, research methodology, as stipulated in *Regulation of the Minister of Science and Higher Education of 25 July 2019 on the standard of education preparing for the teaching profession.* In part

fulfilment of the requirements for the degree of Master of Arts, students submit a thesis reporting on a TEFL-related research project.

To acquire the competences needed to conduct and communicate their own research, students attend an obligatory course called IT in Educational Research, introducing them to qualitative and quantitative data analysis taught by the author. The said course is a follow-up on the course taken a year earlier, Research Methods in Language Education, in which students learn about research design and data collection, also taught by the author. In 2020/21, unlike previous editions of IT in Educational Research, the course was delivered fully online. Four groups of full time and extramural students of English Studies students (n=33) enrolled in the course. As usual, the students had some experience in research design and data collection (due to their participation in the Research Methods in Language Education course) but no experience with data analysis and interpretation.

4.3. Description of the course – statistics-oriented instruction

As mentioned above, the IT in Educational Research course aims to introduce MA TEFL students into both quantitative and qualitative data analysis. In what follows, the focus is on the first part of the course, i.e. the part that deals with quantitative data analysis.

In line with *Regulation of the Minister of Science and Higher Education of 25 July 2019 on the standard of education preparing for the teaching profession*, course goals were defined so as to develop students' basic knowledge and skills concerning statistical concepts and procedures, as well as literacy in the use of PSPP (PSPP – GNU Project 2013, 2020) – a statistical data analysis package, an open source alternative to SPSS. The content was organised into nine topics, each covered in a separate class: (1) Introduction to quantitative data analysis, (2) Data presentation: frequencies, (3) Data presentation: descriptives,

(4) Data presentation: practice, (5) Creating scales and indicators, (6) Correlation coefficients, (7) Statistical significance, (8) Looking for differences: categorical variables, (9) Looking for differences: continuous variables.

Course design was informed by Wild and Pfannkuch's (1999) notion of statistical inquiry, viewed as an investigative cycle that comprises five main steps: (1) Problem − during which the research problem is defined, (2) Plan − which involves measurement decisions, (3) Data – concerning data collection, management and cleaning, (4) Analysis – entailing data exploration, analyses, and hypothesis generation, and (5) Conclusion – which involves interpretation, drawing conclusions, etc. From this perspective, statistical analyses conducted at the Analysis step are part of a broader investigation process, guided by a specific research problem (Watson et al. 2018). The described course is designed to familiarise students with the two final steps in the investigative cycle, i.e. Analysis and Conclusion, constituting the continuation and complement of the previous Research Methods in Language Education course that addressed the first three steps, i.e. Problem, Plan and Data, of the investigative cycle.

All course resources, organised into nine modules according to the topic, were made available on Moodle for in- and out-of class use. As displayed in Figure 1, each module included an inspirational quote, a Google Slides presentation on a specific statistical concept or procedure (resource 1 in Fig. 1), as well as the materials supplementing the presentation (resources 2-4 in Fig. 1), a dataset (resource 5 in Fig. 1), tasks involving students in data analysis using PSPP and the provided dataset (resources 6-8 in Fig. 1; Fig. 2), tutorial(s) instructing students on the use of PSPP to complete the tasks, recorded by the instructor and made available online (Fig. 2), a research article featuring the use of the introduced statistical issue(s) (resource 9 in Fig. 1), and reading on an issue to be discusses next class (resource 10 in Fig. 1).

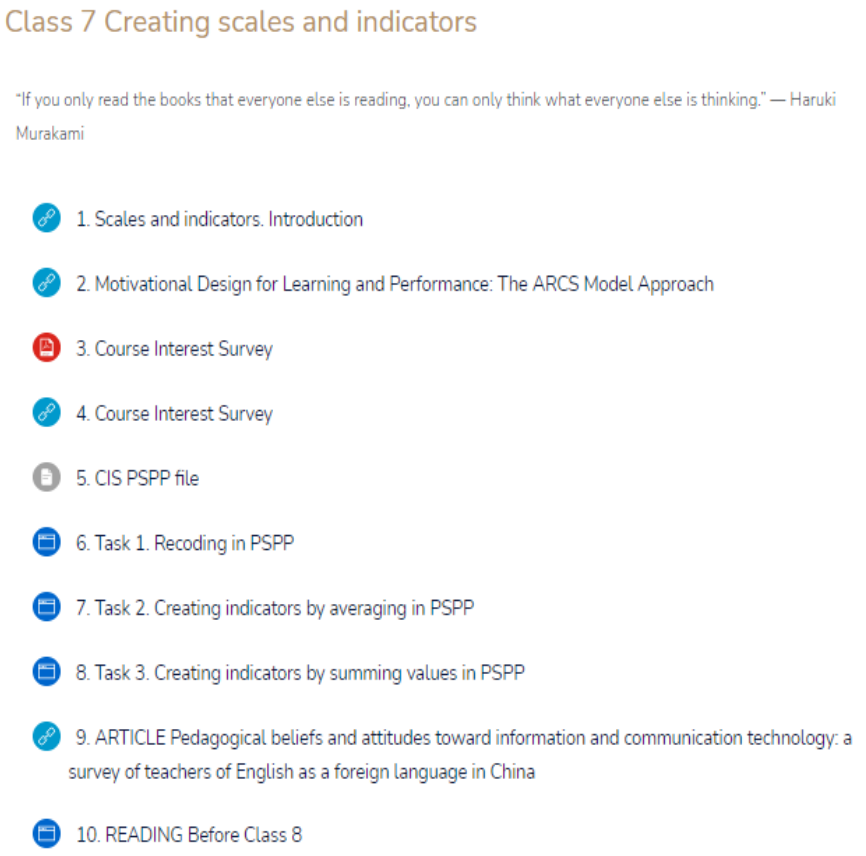

Figure 1
The structure of a sample Moodle module

Each class met online for 90 minutes through MS Teams and would typically consist of six phases.

Phase 1. Warm up. During this stage, an inspirational quote was discussed with the group, reference was made to students' academic and/or professional life, emphasising the importance of knowledge and skills the students were acquiring during the course.

Phase 2. Review of previous class content and general feedback on completed tasks. To enable this, with student consent, the instructor displayed sample student work, commented on statistical issues, clarified doubts.

Phase 3. Consolidation – with the use of a research article. During this stage, to consolidate the knowledge of the covered statistical concepts and/or procedures in the previous class and to reconstruct the steps involved in carrying out a statistical investigation as a whole investigative cycle (Wild and Pfannkuch 1999), class discussed a research article that featured the introduced statistical concepts/procedures. The instructor asked questions about the Problem (e.g. What problem does the study address? What was the purpose of the study? Is such a study needed? Why?), Plan and Data (e.g. How were data collected? Who were participants of the study?), Analysis (e.g. What are the results?), and Conclusion (e.g. What are study conclusions? What are the takeaways for language teachers/researchers? What can researchers investigate next?). Throughout this phase, the instructor highlighted the ways in which the paper is similar to students' own empirical projects and the structure of their thesis.

Phase 4. Introduction to a new statistical concept and/or procedure. In this phase, the instructor, making reference to the content assigned for reading before class, covered a new statistical concept/procedure using a Google Slides presentation (resource 1 in Fig. 1), and additional materials (resources 2-4 in Fig. 1).

Phase 5. Data analysis tasks. Having made students familiar with statistical concepts, the instructor overviewed data analysis tasks (resources 7-8 in Fig. 1). Each task contained instructions requiring students to apply the previously discussed concepts and/or statistical procedure with the use of PSPP (Fig. 2). To this end, students were provided with a dataset (resource 5 in Fig. 1) and online tutorial/s explaining how to conduct

specific analyses using PSPP. Students were asked to publish their answers in their online Google Docs/ MS Word Workbooks (Fig. 3) by the end of the class and allowed to complete tasks out-of-class, if they experienced technical or other problems. Students completed data analysis tasks individually and the instructor was available through MS Teams for consultation throughout class time.

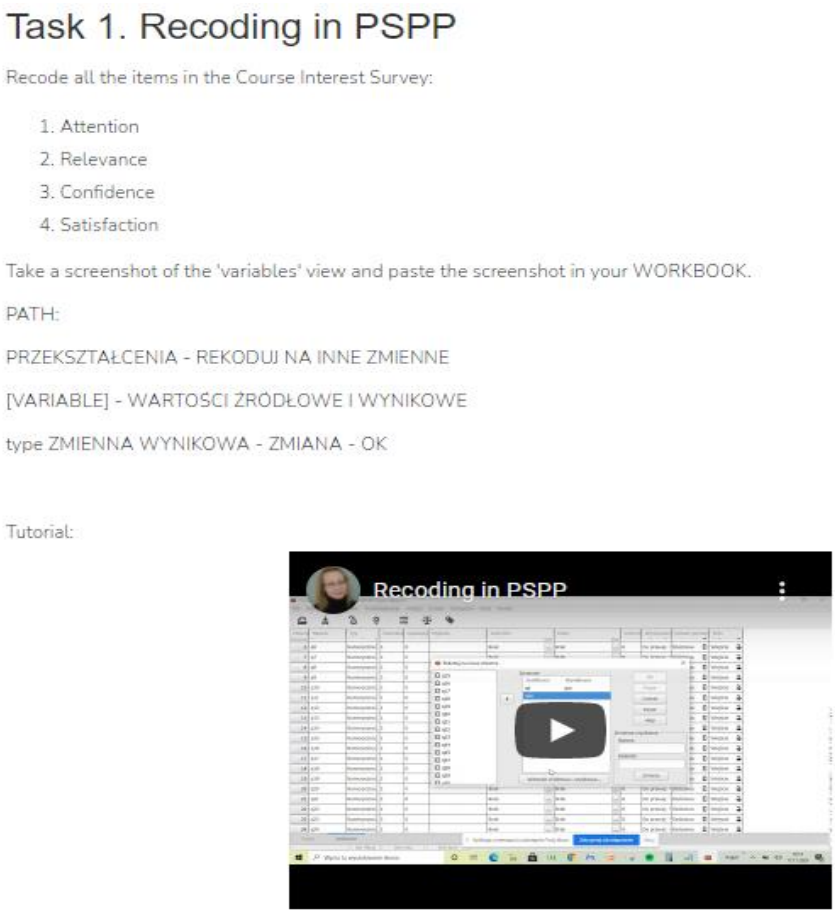

Figure 2
Sample data analysis task with PSPP

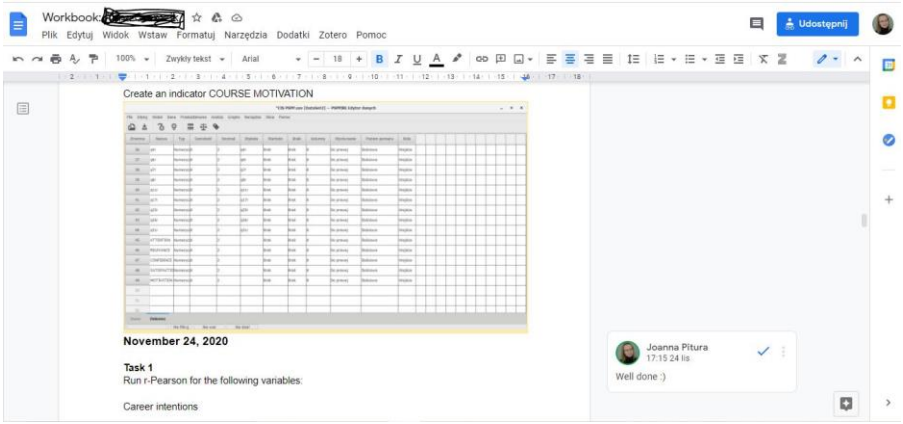

Figure 3
Students' workbook – creating scales and indicators

Phase 6. Wrap up. A few minutes before the end of class, students gathered in MS Teams. The instructor inquired about progress and difficulties, and reminded the students to complete the tasks before next class, had they not managed to complete the tasks in class. The instructor also informed about reading materials to be discussed next class, i.e. a research article featuring statistical concepts and/or procedures (resource 9 in Fig. 1) for Phase 3 and a reading material on a concept planned to be covered in Phase 4 next class (resource 10 in Fig. 1).

In order to get credit for the course, students needed to comply with the following requirements: 1) submission of all in-class tasks at a satisfactory level, 2) reading of the assigned texts before class, 3) being present in online classes, 4) being active in class. At the end of the course, students took an exam that assessed quantitative (and qualitative) data analysis knowledge and skills in the form of a multiple-choice test of knowledge and a PSPP performance task.

4.4. Data collection and analysis

When the course transitioned towards the second part, i.e. qualitative data analysis, to provide students with a meaningful

textual dataset, students were asked to narrate their experiences with statistics before, during and after their learning. Instructions for the writing of a story are presented in Figure 4.

Reflect on your experiences concerning statistics in this course. With this in mind, write a story – in the first person – with a beginning, middle and end, including your actions, thoughts and feelings as they appeared at various moments of this course (IT in Didactic Research). In your story, make sure to include your account of the following:
1. The description of the first class in which you started to learn statistics – what did you think and feel back then?
2. What were your beliefs, values, assumptions, and practices regarding statistics and doing research into foreign language learning and teaching?
3. What happened after the first class in which you started to learn statistics? What did you do, think and feel throughout the course regarding statistics and doing research into foreign language learning and teaching?
4. What did you learn in this class as a result when it comes to statistics and doing research into foreign language learning and teaching?
5. What changes do you observe now in your views regarding statistics and doing research into foreign language learning and teaching?

Figure 4
Instructions for writing student stories around statistics

This study analyses these stories, submitted as part of student coursework. When the course finished, informed consent for the use of this work was obtained in writing from twenty five students (female n=22, male n=3), out of all students enrolled in the course (n=33). Ultimately, the dataset contained 8498 words.

Following (Dörnyei 2011), content analysis was conducted in four steps with the use of QDA Miner Lite (Provalis Research n.d.). First, texts were sorted and compiled in one QDA project. All stories were next read to obtain a general sense of the

information provided in student texts. After that, data were coded for the linguistic resources used to make reference to statistics before, during and after the course, applying the predetermined codes drawn from the Appraisal framework in three categories: Judgement, Appreciation and Affect (Hood 2019; Martin and White 2005). Specifically, the Judgement category included five types of codes to capture students' positive and negative judgements of themselves, the way they behaved, and their character, i.e. normality (how special a student is, e.g. fortunate, odd), capacity (how in/capable a student is, e.g. competent, unsuccessful), tenacity (i.e. how un/dependable a student is, e.g. patient, distracted), veracity (i.e. how un/truthful a student is, e.g. credible, dishonest), and propriety (i.e. how un/ethical a student is, e.g. respectful, rude). The Appreciation category covered the codes referring to the positive and negative evaluations of statistics: reaction-attention (i.e. whether it caught student attention, e.g. fascinating, boring), reaction-quality (i.e. whether students liked it, e.g. good, nasty), composition-balance (i.e. whether it was coherent, e.g. logical, disorganised), composition-complexity (i.e. how hard was it to follow, e.g. simple, unclear), and valuation (i.e. whether learning/statistics was worthwhile, e.g. valuable, useless). The Affect category covered the linguistic realisations comprising: un/happiness (i.e. emotions concerned with "affairs of the heart", e.g. love, hate), in/security (i.e. emotions to do with "ecosocial well-being", e.g. assured, anxious), di/satisfaction (i.e. emotions concerned with "telos (the pursuit of goals)", e.g. curiosity, displeasure), dis/inclination (i.e. triggered emotions, e.g. fear, desire) (Martin and White 2005: 48-51). The sub-category of "surprise" in Affect-in/security has been replaced with "perturbance" (Martin 2017). Application of a code was realised when students explicitly used the lexis instantiating a given category or when the meaning was realised indirectly as invoked attitude. Finally, the codes were retrieved for each type of Attitude, quantified, visualised in figures and tables, and described maintaining the chronology of experience, i.e. before, during and after statistics learning. While reporting the findings, positive and negative

charging is indicated as +/-, e.g. Capacity-, Capacity+, invoked attitude is italicised and students words are quoted to exemplify the use of linguistic resources indicating their attitude.

5. Results

5.1. Judgement: student evaluations of themselves as learners of statistics

Students' use of the evaluative language to express judgment of themselves before, during and after learning statistics is displayed in Figure 5 and Table 2.

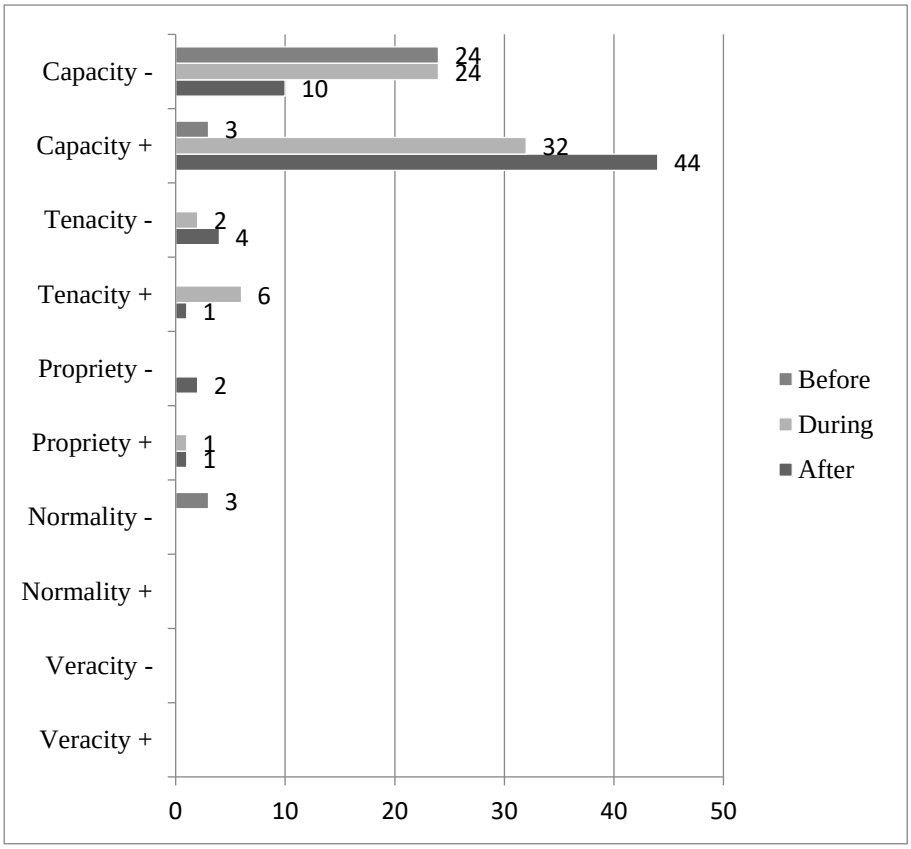

Figure 5
Evaluative resources for expressing Judgement

Table 2
Linguistic resources for construing Judgement

Type	Before	During	After
Normality+	—	—	—
Normality-	a theory person, a humanistic soul, did not think about statistics and research, focused… attention on topics more down to earth	—	—
Capacity+	aware	*competent*, able, grasped, aware	*competent, literate*,* understood, not regard statistics as undoable, make progress, will use in the thesis and future
Capacity-	*incompetent, semi-competent,* inexperienced, *unfamiliar,* not good at maths, *ignorant*	*struggling, challenge*, doubtful*	know but.., not able, not an expert, green*
Tenacity+	—	*persevering*	*Resolute*
Tenacity-	—	need to concentrate more, reluctantly	*Undependable*
Veracity+	—	—	—
Veracity-	—	—	—
Propriety+	—	gained respect	take off sb's hat

Propriety-	—	—	should be interested; no need to be antagonistic

*used with reference to PSPP

Reference to student Capacity- was very frequent before (N=24) and during (N=24) the course and it was far less frequent after the course (N=10), while the use of the resources to convey Capacity+ increases over time (before N=3; during N=32, after N=44). The linguistic resources to express Tenacity were less frequent; they were used to express negative evaluations during the course (N=6; before N=0; after N=1), whereas positive evaluations were expressed mainly after the course (N=4; before N=0; during N=2). The occurrence of evaluative language with regard to students' Normality and Propriety were rare (Normality- before N=3, Normality+ after N=0; Propriety+ before N=0, during N=1, after N=1; Propriety- before N=0, during N=0, after N=2). No resources concerning Veracity were found in student stories. Before the course, the students made reference to Capacity- using the resources to do with criticism, i.e. *incompetent* (e.g. "Before the course I knew nothing about statistic"), *semi-competent* – when they indicated that they knew "how to make good interviews" or what the term meant, inexperienced – due to the previous BA stage when they did not conduct any research, *unfamiliar* with software for statistical analyses, not good at maths (e.g. "I was never good at maths), *ignorant* (e.g. "I should be aware of the fact how important statistics is, but actually I had not appreciated it before"). The students signalled Capacity+ using the resources to do with admiration, i.e. aware (e.g. "I was aware of the fact that after finishing my M.A. research I would have to present the results using statistics"). As to Normality, the students expressed criticism, describing themselves as being a "theory person", a "humanistic soul", or the one who "did not think about statistics and research and focused… attention on topics more down to earth".

During the course, the students used language to indicate admiration in the area of Capacity+, i.e. *competent* (e.g. "Throughout the whole course I have learnt many new terms such as mean, mode, variables etc"), able ("Sometimes I felt lost as I did not understand some terminology or relationships in statistic but that's just the process – even if I struggle at the beginning I am able to learn it eventually :)"), grasped ("I grasped the idea of doing the statistics quite quickly"), aware ("I was well aware that I really need to learn them [statistical concepts] in order to complete my dissertation"). The student also used linguistic resources to express their *struggling* to understand the terms, *challenges* using PSPP and applying the knowledge to own research or context. They were also *doubtful* of their ability to complete the tasks. As to signalling Tenacity+, the students used the language to express admiration for being *persevering,* i.e. by following instructions and completing course assignments. As to their criticism in this area, one student realised that s/he "need[ed] to concentrate more" and another one disclosed that she "reluctantly installed the program, followed the first class and did the tasks assigned for the session". Finally, with reference to Propriety+, one student indicated that s/he "gained a lot of respect for people working in research".

After the course, concerning Capacity+, the students used the resources to express admiration, i.e. being *competent* enough to conduct their own research project, including data analysis, being PSPP *literate* (e.g. "I got to know PSPP and learned how to use it and analyse the tables and charts created with the usage of it".), another student understood that "such research projects are not based solely on tests, surveys etc. but that these are just the tools which help to see the bigger picture"), yet another one does "not regard statistics as something undoable". Another student "feel[s] that [s/he] made a lot of progress" one "will use all that [s/he has] learnt not only in [his/her] thesis, but also in the future". As to Capacity-, the students expressed criticism, i.e. know but.. (e.g. "I know how to present the results of the research but I still need to look at the exercises once again to revise my knowledge about how to

use PSPP and do some more practice"), not able ("The problem is that no matter how hard I try to understand and count statistics, I am not able to do it"), not an expert (e.g. "I can't name myself an expert"), green ("I am still green when it comes to entering variables and analyzing them correctly [in PSPP]"). Concerning Tenacity-, the students describe their knowledge as *undependable* (e.g. "As for the theory, I really need to go through my notes a few times more, since there are still some issues that I have not fully understood yet"). On the other hand, positive reference is made to Tenacity+ with the use of the linguistic resource to do with being *resolute* (e.g. "All in all, there is nothing more I can do but to get familiar with statistics"). Regarding Propriety- resources, the students use language to express condemnation for not being interested (e.g. "We belong to this particular group therefore, we should be interested with everything that is connected to it, as certain information can be eye- opening") or antagonistic (e.g. "I can now see that I do not need to be so antagonistic towards statistics"), and one student declared gaining respect ("I take off my hat to educational researchers").

5.2. Appreciation: student evaluation of statistics

The students use a number of linguistic resources to construe evaluation of statistics before, during, and after their learning (see Figure 6 and Table 3).

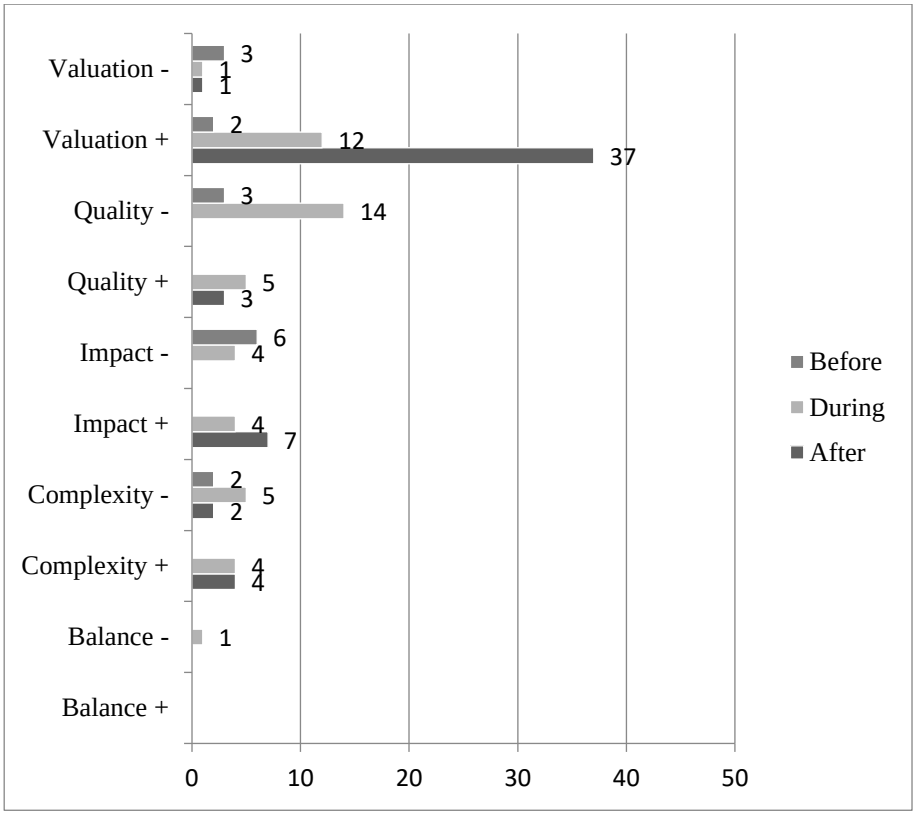

Figure 6
Evaluative resources for expressing Appreciation

Table 3
Linguistic resources for construing Appreciation

Type	Before	During	After
Impact+	—	entertaining, fun, joy, a novelty	interesting, fascinating, not scary, not intimidating
Impact-	tedious, boring, intimidating, monotonous	boring, dull, intimidating, statistics truly did sb in	—

Quality+	—	pleasure, easy, not hard, institutive*	great, great*, perfect*
Quality-	hard, difficult, tough	new, demanding, difficulty, not simple, challenging*, clunky*	—
Balance+	—	—	—
Balance-	—	*obscurity*	—
Complexity+	—	clear, feasible, manageable	not as difficult, not undoable, less challenging, feasible
Complexity-	incomprehensible, not straight- forward, many nooks and crannies	incomprehensible, complicated*, problems wrapping one's head around*	complicated, not a piece of cake
Valuation+	helpful, important	useful, practical, relevant, power, necessary, indispensable, beneficial, helpful*, cool*, useful*	helpful, valuable, crucial, useful, an asset in sb's CV*, can do wonders and save time*, *indispensable**, *a facilitator**
Valuation-	for mathematicians and scientists, not down-to- earth	non-user friendly*	time- consuming

*used with reference to PSPP

As displayed in Figure 6, the most frequent type of evaluation is made with reference to Valuation of statistics, signalling whether learning/statistics was worthwhile. The language produced by the students contained few Valuation+ references to statistics before the course (N=2), the number markedly increased in students accounts during and after the course (N=12 and N=37 respectively), while Valuation- of statistics remained rare (before N=3, during N=1, after N=1). The second most frequent type of evaluation concerns the Quality of statistics, used to indicate whether the students liked it and whether it was pleasing. The language produced by the students contained Quality+ evaluations during (N=5) and after (N=3) the course and no references were made before the course, while Quality- evaluations were made before (N=3) and during (N=14) the course and no Quality- comments were made after the course. References to Impact and Complexity are fewer (Impact+ before n=0, during n=6, after n=3; Complexity before n=2, during n=5, after n=2) and the occurrence of evaluative language to do with Balance is the least used evaluative resource (during n=1).

Before the course, the students indicated Impact- of statistics using the linguistic resources, such as tedious, boring, and intimidating, and stated that presenting research data was a monotonous task. The students signalled Quality- of statistics using words such as hard, difficult and tough "even in [the] mother tongue, not to mention a foreign language". The students also used linguistic resources to indicate Complexity- of statistics for being *incomprehensible* (e.g. "The words of Results sections were simple, but the symbols seemed like a completely new language to me"), not straight-forward and having many nooks and crannies ("I considered statistics and research to be straight-forward; create a survey, gather results, and present them. It turns out that apart from that, there are many nooks and crannies that can be missed with such, honestly, limited approach"). The students pointed out Valuation+ of statistics as *helpful* for the writing the thesis and data collection and analysis and important, while Valuation- was realised by the resources, i.e. not down to earth and for mathematicians and scientists ("I thought

that statistics is for mathematicians and research is for scientists", "To me, statistics was a foreign term from the realm of mathematics, a realm I thought I have escaped by graduating from high school").

During the course, the students signalled Impact+ of statistics for being entertaining, associated with fun and joy, and for analyzing numbers, survey answers, PSPP software being a novelty. Impact- of statistics was realised by the use of the resources such as boring (e.g. "At the beginning of our classes I thought the course was going to be very boring"), dull (e.g. "learning about the statistics was quite dull at times"), intimidating, and statistics truly left one student exhausted and undermined. The students indicated Quality- by using the resources such as pleasure − associated with creating bar charts, pie charts and tables, easy (e.g. "quite easy to figure out with the help of tutorials"), not hard (e.g. "Then we started classes devoted to PSPP and thanks to the tutorials that the teacher prepared, those classes were not hard") and intuitive (e.g. "PSPP turned out to be very intuitive"). Concerning the resources to express Quality-, the realisations included the use of the resources such as new (e.g. "when I was reading a book about statistics … all these terms where totally new for me".), demanding *(*"it was one of the most demanding subjects"), difficulty (e.g.

"After the first class I was terrified with the difficulty of the tasks"), not simple ("obligatory tasks on moodle on my own although they were not simple"), challenging (e.g. "Some operations in PSPP were challenging") and PSPP "felt clunky … to use". The students made evaluation with regard to Balance- using the resources such invoking obscurity ("At first, I was not able to correlate the content provided with what was going to happen next"). Concerning Complexity+, the students used the resources such as clear (e.g. "Everything was clear to me".), statistics and the assignments were feasible and manageable, while Complexity- was commented with the use of the resources such as incomprehensible – made referring to statistical concepts, complicated at first – made with reference to PSPP, and having "problems wrapping [student's] head around" some of the

functions in PSPP. Finally, as to Valuation+ of statistics, the students used the following linguistic resources: useful (e.g. "I understood that abilities concerning statistics may be extremely useful when doing research on a larger group of participants"), practical (e.g. "I perceived the practicality of the course from the beginning"), and *relevant* (e.g. "Applicability in relation to my MA thesis is something that motivated me to study"). Statistics is also valued for "its power to organize what was disorganised and to label the terms that seemed impossible to be defined", necessary ("I assumed that it had to be necessary to take an insight into it with regard to my MA thesis"), indispensable ("after the first class presentation I realized that statistics are also indispensable when it comes to researching language learning and teaching"), and beneficial ("The data, and all the operations that can we do with it (comparing sets of data and dividing variables into groups etc.), is very beneficial".). PSPP is described as helpful in creating tables and figures, a cool tool for statistical analysis, and *useful* (e.g. "a free software application for analysis of sampled data, which we will use during collecting and describing the results in the result section in our MA theses"). Only one student made reference to PSPP to express negative evaluation of PSPP at the beginning of the course, suspecting that PSPP was "a non-user friendly program [s/he] would download, install and never use again".

After the course, the students use language to express Impact+ of statistics, i.e. interesting (e.g. "It was interesting to learn all of it "behind the scenes"), fascinating (e.g. "It is clear to me that statistics is a fascinating field of study to explore".), not scary (e.g. "Terms such as 'a variable' or 'a measurement scale' are not as scary as they used to be".) and not intimidating (e.g. "right now I do not find statistics intimidating"). The students signal Quality+ of statistics, i.e. great knowledge, including evaluation of PSPP as a great tool and a perfect programme to analyse and present data. To express Complexity+, the students use the resources such as "not as difficult as it may seem at the beginning, especially when you use particular software", do not regard statistics as undoable, less challenging and feasible.

There are students, however, who describe statistics as still complicated and "not a piece of cake". As to Valuation+, the students indicate appreciation by using the resources such as helpful, valuable, crucial (e.g. "Knowing how to interpret data collected after the study is crucial".), useful to understand research papers, to complete M.A. theses, to complete their degree, and useful in the future. PSPP is talked about as an asset in sb's CV, being able to do wonders and save time (e.g. "I see now that the right software can do wonders and save a lot of your time"), *indispensable* (e.g. "Moreover, I cannot imagine, how difficult it would be to carry out the research without those tools"), and a *facilitator* ("PSPP can act as a bridge between people that do not really fancy maths and the possibility of them using statistics"). Only one student made a negative comment by stating that statistical analyses are time-consuming.

5.3. Affect: construing emotions around learning statistics

The students use four major sets of linguistic resources to do with Un/Happiness, In/Security, Dis/Satisfaction, and Dis/Inclination to express affective states appearing before, during and after statistics learning (Figure 7 and Table 4).

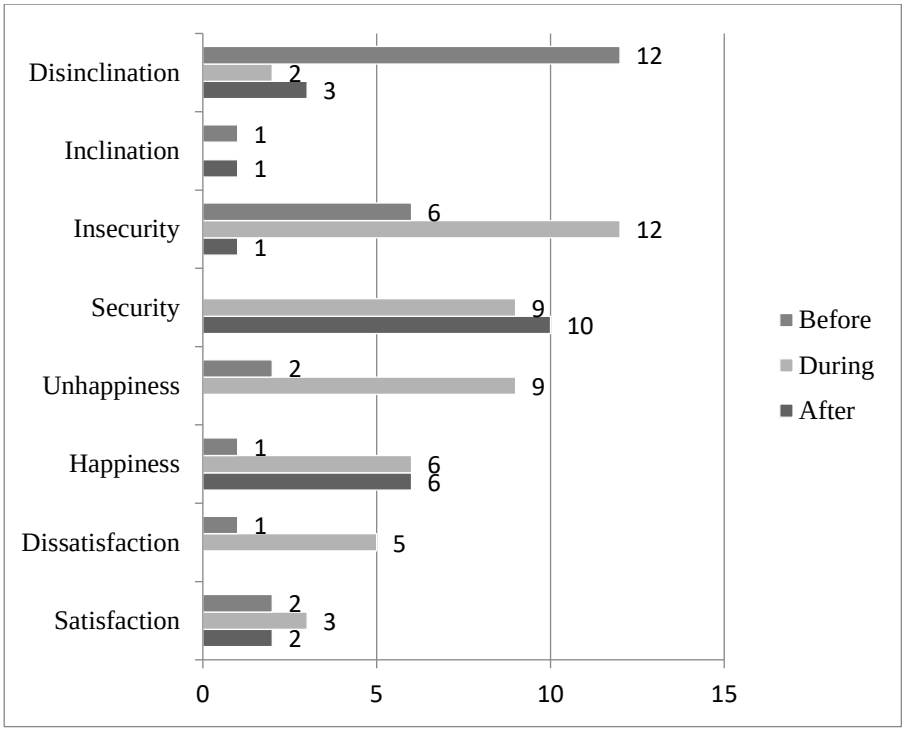

Figure 7
Evaluative resources for expressing Affect

Table 4
Linguistic resources for construing Affect

Type	Before	During	After
Happiness	Cheer: excited	Cheer: excited Affection: like, fascination, have a taste for, love-hate relationship, best friend*	Affection: grateful, admire, friend*
Unhappiness	Antipathy: hate, not enjoy	Misery: not too excited, burst into tears Antipathy: not enthusiastic,	—

		not sb's cup of tea, rebellious	
Satisfaction	Pleasure: glad Interest: curiosity	Pleasure: pleasure, enjoy, satisfaction	Pleasure: enjoy, glad
Dissatisfaction	Ennui: not interested	Ennui: bored Displeasure: overwhelmed	—
Security	—	Confidence: confident, relieved/relief Trust: comfortable, safe	Confidence: certain, convinced, *assured* Trust: comfortable with
Insecurity	Disquiet: scared, apprehensive, stressed, have doubts and uncertainties*	Disquiet: overwhelmed, terrified, anxious, lost*, not sure* Perturbance: surprised, befuddled, puzzled*	Disquiet: *uneasy*
Inclination	—	—	Desire: eager
Disinclination	Fear: not optimistic, discouraged, afraid, frightened, terrified, apprehensive, sceptical, antagonistic	Fear: overwhelmed, suspicious	Fear: scared, concerned

*used with reference to PSPP

As presented in Figure 7, reference to the Disinclination set of meanings was the most frequent before the course (N=12) and it was far less frequent during (N=2) and after (N=3) the course, while the use of the resources indicating Inclination remained rare (before N=1; during N=0; after N=1). The linguistic resources to express Insecurity were mostly used to make reference to students' experiences before (N=6) and during (N=12) the course, whereas the linguistic resources to express Security were mostly used to refer to students' experiences during (N=9) and after (N=10) the course. The occurrence of evaluative language to do with Unhappiness was most frequent during the course (N=9; before N=2; after N=0), while the occurrence of evaluative language with reference to Happiness was similar during (N=6) and after (N=6), before the course it was sparse (n=1). The use of the resources concerning Dissatisfaction was most frequent while making reference to emotions during the course (N=5; before N=1; after N=0) and the use of the resources concerning Satisfaction was infrequent (before N=2; during N=3; after N=2).

Before the course, the students signalled Un/Happiness using the resources to do with cheer, i.e. excited (e.g. "First of all, I was excited about the fact that a new subject appeared"), as well as antipathy, i.e. hate, not enjoy (e.g. "I thought that I would hate those classes"; "I did not think that I would enjoy this classes at all"). In order to express Satisfaction, the students used the resources to do with pleasure, i.e. glad (e.g. "I am glad that such a course has appeared during this semester") and interest, i.e. curious (e.g. "very curious to find out what it will be about"). To express Dissatisfaction, the students used the resources to do with ennui, i.e. not interested (e.g. "I have not read any articles concerning statistics and research when it comes to teaching before, I was not interested in such studies"). As to In/Security, the students used the re-sources to express disquiet, i.e. scared (e.g. "I was a bit scared"), apprehensive (e.g. "I was pretty apprehensive towards [statistics]"), stressed (e.g. "Waiting for my first class, with a heart pounding with stress"), they also indicate having doubts and uncertainties (e.g. "I had

no idea that there was a special program to solve all my doubts as well as uncertainties – PSPP".). Finally, to indicate Disinclination, they use the resources to do with fear, i.e. not optimistic (e.g. "I was not so optimistic about this classes".), discouraged (e.g. "I was a little bit discouraged by numbers, tables and new ICT tools".), afraid (e.g. "I was a little bit both afraid and curious what we would learn"), frightened (e.g. "have to admit that I was a bit frightened that the classes would turn out to be very hard"), terrified (e.g. "I always thought that statistics is only for people who study Maths, Finance etc. So when I found out that my group will learn some statistics I was terrified".), apprehensive (e.g. "I was pretty apprehensive towards [statistics]"), sceptical (e.g. "I was never good at maths and when I found out that we would learn about statistics, which for me connotes with maths, I was very sceptical".) and antagonistic ("I can now see that I do not need to be so antagonistic towards statistics".).

During the course, the students signalled Happiness using the resources to do with cheer, i.e. excited (e.g. "After first classes I was a bit scared, but also excited") and affection, i.e. like and fascination (e.g. "I like reading different tables and comparing the results";"I felt some kind of fascination towards this discipline"), the taste for statistics − which can be developed with technology, although that could be a "love-hate relationship" (e.g. "I was yet to see it was going to be a love-hate relationship-the more I learned about statistics, the more complicated the terms I encountered"). The students also use the resources form this category to make reference to PSPP as their best friend (e.g. "At one point I even came to the conclusion that [PSPP] will become my 'best friend' when I will be writing the part of my thesis concerning the data I would have collected".). As to Unhappiness, the students used the resources to express misery, i.e. not too excited (e.g. "When we first started working on statistics, I have to admit, I did not feel too excited"), burst into tears (e.g. "After (actually even in the middle of) the first lesson, I burst into tears".), as well as antipathy, i.e. not enthusiastic (e.g. "Not to mention statistics have some elements of my least favourite subject; maths, which made me feel even less enthusiastic"), not

my cup of tea (e.g. “During the first class in which we started to learn statistics I felt that it is not my cup of tea”), and rebellious (e.g. “I felt a bit rebellious. After all, why do English teachers need such extensive knowledge of statistics when they could do perfectly well with means and standard deviation only?”). To express Satisfaction, the students used the resources to do with pleasure, i.e. pleasure (e.g. “It was a pleas-ure to do the bar charts, circle charts and excel tables”.), enjoy (e.g. “I really enjoyed using the PSPP programme and doing exercises with it”.) and satisfaction (e.g. “always at the end, when I finally grasped the idea, the feeling of satisfaction was fulfilling me”). To express Dissatisfaction, the students used the resources to do with ennui, i.e. bored (e.g. “At the beginning of our classes I felt …already bored), displeasure, i.e. overwhelmed (e.g. “I was a bit overwhelmed by the knowledge I received”). Concerning Security, the students used the resources to do with confidence, i.e. confident and relief/relieved (e.g. “although sometimes the subject was similar to math, most of the counting was done by a software called “PSPP”, therefore eventually I felt relieved that the nightmares of my high school will not repeat”.; “After our first class, I let out a sigh of relief”) and trust, i.e. comfortable and safe (e.g. “But the tutorials provided by the teacher made me feel comfortable and safe, I could watch them at my own pace at any time I wanted”.). As to Insecurity, the students used the resources to indicate disquiet, i.e. overwhelmed and terrified (e.g. “When we first started our IT classes I felt a bit overwhelmed and terrified”.), anxious (e.g. “In the very first class, I felt extremely anxious”.). The students also felt lost when they did not understand statistical terminology and one student pointed out that s/he was not quite sure what s/he actually did while using PSPP. Additionally, as to Insecurity, the students used the resources to do with perturbance, i.e. surprised and befuddled (“I had no idea that I will learn about [statistics] during my studies. I was surprised, but I was not completely befuddled due to the fact I was a member of mathematics-extended class in high school”.), as well as puzzled (“at first, I was puzzled when I had to do the very first task in this

programme). Regarding Dis/Inclination, the students used the resources to do with fear, i.e. overwhelmed (e.g. "I was overwhelmed with the prospect of further tasks and getting the credit for this course") and suspicious (e.g. "At first I was suspicious… about learning about statistics").

Concerning the emotional reactions after the course, to indicate Un/Happiness, the students use the resources to do with affection, i.e. grateful (e.g. "I am really grateful that we had this statistics classes because I could find out how complex data collection process is"), admire (e.g. "I admire people who decide to go into statistics and explore this topic in depth") and friend (e.g. "PSPP [has] become my [friend]"). As to Dis/Satisfaction, the students use the resources to do with pleasure, i.e. enjoy (e.g. "To sum up, I really enjoyed this course") and glad (e.g. "I learned a lot during this course and I am glad that I was given an opportunity to do so"). Concerning Security, the students make reference to their sense of confidence, i.e. certain, convinced, *assured* (e.g. I feel that I have the knowledge to conduct my research and show its results in the right and correct way.) and trust i.e. comfortable with (e.g. "Now I feel more comfortable with the statistics"). As to Insecurity, the students make reference to the state of disquiet, i.e. *uneasy* (e.g. "I would love to use this tool in my M.A. dissertation, but I still do not know why… Maybe in the future, I will be confident enough to use it".). Finally, with regard to Dis/Inclination, the students use the resources to do with desire, i.e. eager (e.g. "Now, I am eager to investigate this topic more".) and fear, i.e. scared (e.g. "believe or not I am scared till now.), concerned (e.g. "I still have to devote some time to it, as I wonder how to present my data (not fully collected yet) in my MA thesis, what makes me concerned a little bit".).

6. Discussion

Student attitude to statistics is of great importance for researchers and instructors as these may have impact on achievement in statistics learning. Applying the Attitude subsystem as

an analytical lens, this study was conducted to investigate positive and negative statistics-related attitude among MA TEFL stu-dents, manifest in their stories of learning experiences through the choice of evaluative language. On the whole, the study makes visible a great variety and a considerable variation of linguistic means which higher education students use to express statistics-related attitude as Judgement, Appreciation and Affect, emerging over time as students engage with course content.

When construing Judgement of themselves and their behaviour as learners of statistics, the students most often made reference to their capacity as learners and users of statistics and PSPP software. It was found that, to demonstrate attitude existing before the course, the students predominantly used linguistic resources to point out lacks and weaknesses in their capacity, evaluating themselves as incompetent, unfamiliar, not being good at maths, etc. During the course, the students also often made reference to their weaknesses in this regard and, in addition, they used language to describe them-selves as struggling learners. However, they simultaneously produced language to indicate being increasingly competent, aware and capable of learning and using statistics. After the course, the use of the linguistic resources positively evaluating student capacity were by far the most numerous, using the resources to denote themselves as competent and literate. This suggests that student attitude as Judgement changed over time; the students regarded themselves to be able to gradually acquire and deal with statistical concepts and procedures, even though they faced challenges throughout their learning. This result echoes the findings obtained in prior studies showing that course completion positively impacts students' statistical self-efficacy (Gonulal et al. 2017) or self-reported competence (Smith 2017). This study uncovered a broader set of attitudes of positive and negative charging to express students' evolving attitudes as learners and users of statistics, showing that students can consider themselves to be, among others, able, aware, literate, persevering, resolute, respectful, as well as ignorant, doubtful, green, reluctant, etc.

Next, it was revealed that when construing Appreciation of statistics, the students most frequently made reference to the value of statistics. The results demonstrate that the students rarely used language to express the value of statistics before the course, but the frequency of language means positive evaluating statistics increased over time. In their context, the students found statistics to be important, necessary, indispensable, useful, helpful, valuable, etc. Additionally, the students made positive evaluations of PSPP as a time-saving tool, the literacy in which can be beneficial. It was also found that the students most often reported their reactions concerning Quality, which they realised by referring to statistics and the use of PSPP as difficult, demanding, challenging, etc. before and during the course, but not after the course. These results imply that, similar to Judgement, student attitude as Appreciation of statistics also evolved over time: from rarely to frequently perceived value of statistics. Beyond this, the results confirm these obtained in earlier research indicating that students may find statistics interesting (Snider and Eliasson 2013), important (Gonulal et al. 2017; Huang 2013; Smith 2017), relevant (Lalayants 2012) and believe that software literacy facilitates statistical competence (Huang 2013). This study further elaborates on student attitudes in this regard and uncovers a wider range of positive and negative attitudes, registering linguistic resources to do with Impact, Quality, Balance, Complexity and Valuation, showing that students can consider statistics and the use of statistical software to be fun, entertaining, fascinating, great, easy, clear, feasible, manageable, useful, crucial, valuable, perfect, indispensable, as well as tedious, boring, monotonous, intimidating, demanding, challenging, incomprehensible complicated, clunky, non-user friendly, etc.

As to attitude as Affect, the study found that when expressing emotions around statistics, the students mostly used linguistic resources to express disinclination before the course, insecurity and unhappiness during the course, but at the same time indicating security and happiness during and after the course. The results concerning positive emotions such as interest and being

comfortable with statistics, as well as negative emotions, such as anxiety, fear, intimidation, corroborate the findings obtained by Lalayants (2012) and Smith (2017). Yet, this investigation brought a more nuanced set of evaluative language, revealing that students can experience far more emotional states, including these to do with cheer, affection, pleasure, confidence, trust, desire, as well as antipathy, misery, ennui, displeasure, disquiet, and fear.

Given that the data were analysed and interpreted by one researcher, one of the limitations concerns the validity and reliability of the findings. Despite researcher's efforts to achieve the accuracy of the findings by ensuring consistency with the definition of codes and using a rich description of the findings, the results may be biased. Another limitation of this study is that the analysis is based on the stories produced by students in a very specific context. Consequently, the findings cannot be extrapolated to a larger population of MA TEFL students. Nevertheless, it can be assumed that the analysis of language produced by these students sheds some light on the linguistic resources used by them for indicating attitude in tertiary-level statistics education.

Further research could determine what linguistic resources MA students in language-related fields use to express their attitude to statistics when they complete their own research projects. Having experience of their own investigative cycle (Wild and Pfannkuch 1999), it may be the case that these students make use of certain linguistic resources to express attitude differently. Additionally, as analysed linguistic resources can be language and culture dependent, further research could investigate higher education students from different socio-cultural backgrounds to determine factors that impact their attitudes towards statistics.

7. Conclusion

Recognizing the need to advance research methods in Applied Linguistics, SLA, TEFL/TESOL, attitudes toward statistics become tremendously relevant. With this in mind, analysing student stories of statistics learning makes it possible to observe how language functions to share beliefs, values and emotions in a higher education classroom context (Hood 2019). The results obtained in this study imply that MA TEFL students use language to indicate increasingly more positive Judgement of themselves as statistics learners, more Appreciation of statistics, as well as more positive Affect associated with statistical literacy and statistical training. As such, this study advances methodological practices and training in the field.

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Joanna Pitura
ORCID iD: 0000-0003-1659-1995
Uniwersytet Komisji Edukacji Narodowej
w Krakowie
ul. Podchorążych 2, 30-084 Kraków
Poland
joanna.pitura@up.krakow.pl